APOLOGIES are in order to all beacause I didn't give the games REVERSE
and SIMON a good going-over before printing them, and there are a number
of errors. Since then, Brett has also managed to simplify SIMON, and the
corrections to both appear later on. By the way, unless you fellows and
gals are really desperate, I think that questions,etc., by mail would be
more completely answered by the contributors instead of by telephone.

SYMBOLS that I have been using may have caused some confusion. Firstly,I
slid into using an asterisk * for the multiplication sign in the hand-
written programs last issue, forgetting that there is an asterisk symbol
on the keypad. From now on I will use a small x for multiplication.
Next, the symbol # is sometimes used for the 'not equals' or ≠ (because
it takes only one key stroke of the typewriter). In the Bally, this does
mean 'not equals' when preceded by IF, and it is also used to describe
a format convention for the tabulation function when preceded by PRINT.
Symbol ∅ is used for the numeral zero to avoid confusion with the
letter 'O'. Symbol 7 is sometimes used for the numeral seven.

UTILIZATION of the Bally by one of our subscribers is unique. They operate
a TV booster system, capturing long distance TV signals on mountain tops
and rebroadcast them into valleys that normally lie in a 'shadow'. The
Bally is used to insert 'commercials'. and programs are developed using
the graphics capability to generate logos, and the &(9) and &(10) are
used for screen wipes, color changes, etc.

SEMINARS are being planned at a couple of locations, being developed by
local dealers. One is being considered in Indiana where all levels of
users would be accommodated, while the other is a bit farther along.
This group will be having a get-together at 2pm on May 12 at the Computer
Center, 28251 Ford Rd. Garden City, MI,(422-2570).

TRANSLATIONS of the various BASIC dialects are contained in the new book,
The BASIC Handbook by David Lien, published by CompuSoft Publishing Co.,
P.O. Box 19669, San Diego, CA 92119, for $14.95 + 1.35 post + CA tax. I
understand that it has 250 statements in BASIC with their meanings, plus
conversion ideas to other dialects. There is a review in the April issue
of Creative Computing, p.143; and an ad in May Kilobaud,p.81.

PROJECTS Who is working on what - and what is your status? We'll get some
of you together so's you only invent the wheel once. Have any of you been
able to use another computer's printing facility to list out the Bally
programs?

MENU as mentioned last time was brought up with a little program, but I've
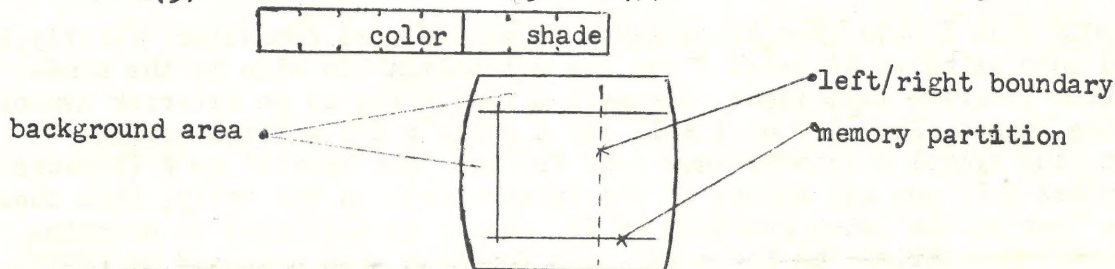had notes that plain CALL 3172 or CALL 3177 will do it.

TUTORIALS (Hows and whys) are needed in the ARCADIAN in order that we can
learn more about the machine and its operation. The talents of our sub-
scribers run the gamut from the tyro to the professional, and for many of
us it is necessary to do things in a cook-book manner, not understanding
what we are doing or why. Explanations such as those that follow are going
to be of great value to us as we plod ahead.

TUTORIAL (1) SCREEN OPERATIONS, by John Perkins.

The screen is divided into a left and a right side with a movable boundary.
The following outputs prevail:

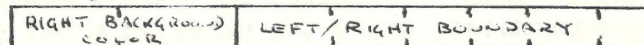&(0)=right side register 0   &(4)=left side register 0
&(1)=   "   "   "   1   &(5)=   "   "   "   1
&(2)=   "   "   "   2   &(6)=   "   "   "   2
&(3)=   "   "   "   3   &(7)=   "   "   "   3

	color	shade

background area •   •left/right boundary
                                                      •memory partition

Bally BASIC continually sets &(4) and &(5) to the color/shade defined by
BC, and &(6) and &(7) to the color/shade defined by FC. These are fixed
while BASIC is in control. But by moving the boundary so that the right
side is visible, we can then control 4 different color/shades by using
the &(0) thru &(3). Example:
    &(0)=30;&(1)=85;&(2)=153;&(3)=125;&(9)=0
Three colors are displayed- listing, background, and 'garbage' at the top.
More on this later. The fourth color should be visible as we scroll the
text into the upper border area. With &(9) at some other value, such as 10,
the screen is divided and the FC and BC commands allow two more colors on
the screen. Actually, &(9) has two functions:

RIGHT BACKGROUND COLOR	LEFT/RIGHT BOUNDARY

The least significant 6 bits set the boundary position (4 pixels or one
memory byte per unit). The most significant 2 bits choose the color re-
gister associated with the left side background and the right side back-
ground. Try &(9)=135.
The 'garbage' mentioned above is actually the stored program, in the
screen memory, using the even bit positions.
Each pixel equates to two bits of memory - 4

SCREEN	PROGRAM
ODD	EVEN

pixels to an 8 bit byte. The two bits of each pixel can have 4 represen-
tations;   00 = &(4) left   or &(0) right
                01 = &(5) left   or &(1) right
                10 = &(6) left   or &(2) right
                11 = &(7) left   or &(3) right   When Bally BASIC sets the
screen boundary (&(9)) all the way to the right, then only the left
registers &(4) to &(7) are used. Since it also sets &(4) and &(5) to BC,
and &(6) and &(7) to FC, only the odd bits of memory show on the screen.
   a 00 is the same color as an 01, and a 10 is the same color as a 11
By storing the program in the even bits it can occupy screen memory (as
every other bit) and yet be invisible. However, by moving the boundary to
the left, the right-side registers are used, and since the program above
set these to different colors, the stored program becomes "visible" as the
garbage at the top of the screen.

&(10) controls how many raster lines are displayed from memory as opposed
to being part of the background. &(10)=204 displays all of memory (RAM)
allowing visual inspection of the running program.

TUTORIAL (2) EXPLANATIONS by Jean Taillefer.

- IF statements will execute as a TRUE condition if the value of the expression results in a value greater than Ø.(The expression could be a calculation) If the value is Ø or negative, the IF statement regards the condition as FALSE.
  Example: IF TR(1) GOTO 100 . will branch to 100 if TR(1) is = 1
         IF A GOTO 110 . will branch to 110 if A is greater than Ø
- AND may be expressed in many ways. The most common form being
  IF A=3 IF B=Ø GOTO 120 . will branch to 120 if and only if A=3 and if B=Ø
  IF(A=3)=(B=0) GOTO 120 . does the same thing
- OR conditions, where you want to jump if either of some conditions are true, can be done by
  IF A=3 GOTO 130
  IF A=6 GOTO 130
  IF A=7 GOTO 130 .meaning that if A is either 3,6,or 7, the program will jump to 130
  IF(A=3)+(A=6)+(A=7) GOTO 130 . does the same thing
- Self-starting programs can be made by inserting the line
  1: RETURN at the beginning, and use this at the end to store on cassette- NT=1; :PRINT;LIST;PRINT"CLEAR;RUN"

TUTORIAL (3) DATA STORAGE by Bob Weber.

This subroutine would be called up in order to save the program, the registers,and the strings by using a GOTO 9000.

```
9000 :PRINT;LIST
9010 FOR Z = 1 TO 26        .less,if you don't have that much
9020 TV = Z + 64             register storage
9030 PRINT #1,%(20076+(Zx2))  "="
9040 NEXT Z
9050 FOR Y = 0 TO N         .where N is the number of strings
9060 PRINT #1,"@(",Y,")=",@(Y)
9070 NEXT Y
9080 PRINT "RUN
```

CHECKERS GAME listing by John Collins,713 Bradford Drive, Ft.Walton Beach, FL 32548 is included. There is an amazing amount of activity in this game, that is comparable to the $75.'Checker Challenger'. Before the machine makes a move, it goes thru some steps, and numbers appear to tell you where it is. The code for the steps is:
1. the computer has found that it can jump one of your men
2. checking to see if you can jump it
3. is a corner open?
4. is there an open move?
5.& 6. have the computer's men moving either to get kinged or towards and player's man left
7. any move an unkinged computer's piece can make
8. any move

To indicate a double jump, enter the two numbers (of the square you go thru and the landing square) as if it were a single jump only.

Errors see page 47,90,77

PROGRAM NAME CHECKERS

Line #	Statement(s)
1	:
4	:
6	:RETURN;CLEAR
8	:PRINT"78(C)CHECKERS←JOHN
	COLLINS";GOSUB 3∅∅∅
50	FOR U=AT∅89;IF@(U)<4
	GOTO55;A=U;U=89
55	NEXT U;FORV=1TO8;PRINT
	V;FORU=AT∅89;IF@(U)<4
	GOTO 91∅
60	FORX=9TO11STEP2;FORG=1
	TO-1STEP-2;IF@(U)=4 G=-1
70	B=G×X;S=U+B;IF@(S)=∅
	GOTO∅∅∅
75	IF@(V)≥2 IF@(S)≠3GOTO 9∅∅
80	C=B+B;F=G×2∅;Z=V×1∅∅;
	J=∅;GOSUBZ;IFJ=1GOTO96∅
90	GOTO9∅∅
100	IF@(U+C)≠3 RETURN
200	IF@(S)-2)∅ RETURN
220	IFV=1 S=U+C;J=1;RETURN
230	FF@(U-B)≠3 RETURN
240	IF@(U-F)>3 S=U-B;U=O-F;
250	IF@(U-C)>3 S=U-B;U=U-C;
	J=1;RETURN
260	IF@(U-B-F)=3 S=U-B-F;
	J=1;RETURN
290	RETURN
300	IF@(S-F)≠1 RETURN
310	IF@(S)=3 J=1;RETURN
320	IF@(S-2×(X-1∅))=3
	S=S-2×(X-1∅);J=1
330	RETURN
400	IF@(U+C)=∅ IF@(U)=4 J=1
410	RETURN
500	IF@(U+C)<3 RETURN
510	IF@(U+F)<3 IF@(U+C-F)
	=3 RETURN
520	IF@(U+C-F)=1 IF@(U+F).
530	=3 RETURN
	GOTO 7∅∅
600	L=1;IF@(U+c)-3<∅ RETURN
610	IF@(U+F)-3<∅ IF@(U+C-F)
	=3 RETURN
620	IF@(U+F)=3 IF@(U+C-F)=1.
	RETURN
630	L=L+1;D=@(U+L×B);IF
	D=∅ RETURN
640	IF D-3>∅ RETURN
650	IFL≠2 IF D-3<∅ J=1;RETURN
660	GOTO 63∅
700	IF@(U)=5 RETURN
800	J=1;RETURN
900	NEXT Q;NEXT X
910	NEXT U;NEXT V
920	BC=8;GOSUB2∅∅∅;PRINT
	"YOU WIN";A=KP;GOTO8
960	R=U;Q=-1;NEXT Q;
	X=11;NEXT X
970	V=8;U=89;NEXT U;NEXT V;
	T=-1;GOTO 12∅∅
1000	PRINT#1,;R,"←"S;
	INPUT" FROM"R;IF S<A A=S
1010	IF@(R)>2 GOTO 1∅∅∅
1020	IF@(R)=∅ GOTO 1∅∅∅
1030	INPUT" TO"S;IF@(S)≠3
	GOTO 1∅∅∅
1040	IF@(R)≠1 IF R>S GOTO1∅∅∅
1200	IF@((S-R)×(S-R))<122
	GOTO 1∅∅∅
1210	IF T>∅ IF@((S+R)÷2)<4
	GOTO 1∅∅∅
1220	J=T;@(S)=@(R);
	@((S+R)÷2)=3;@(R)=3
1400	FOR X=9TO11STEP 2
1410	IF@(S+J×X)=3+T GOTO 145∅
1420	IF@(S+J×X)=3+T+T
	=3 RETURN
	GOTO 145∅

PROGRAM NAME

Line #	Statement(s)
1430	GOTO 15∅∅
1450	IF@(S+2×J×X)≠3GOTO 15∅∅
1460	R=S;S=S+2×J×X
1470	X=11;NEXT X;GOTO 122∅
1500	NEXT X;IF(ABS(@((S)-3)-3)=2
	IF J=T J=-T;GOTO 14∅∅
1510	GOTO 161∅
1600	@(S)=@(R);@(R)=3
1610	IF T>∅ IF S>8∅ @(S)=1
1620	IF T<∅ IF S<2∅ @(S)=5
1630	IF T>∅ GOTO 5∅
1640	T=1;GOSUB 2∅∅∅;GOTO 1∅∅∅
2000	CLEAR;Box 15,2,0,96,86,3
2010	FOR I=12TO89;IF@(I)=∅
	GOTO 21∅∅
2020	M=-25+(I-(I÷1∅)×1∅)×1∅
2030	N=-45+(I÷1∅)×1∅
2040	CX=M-12;CY=N;PRINT#2,I
2050	IF@(I)≠3Box M,N,7,2,1
2060	IF@(I)>3Box M,N,2,2,3
2070	IF ABS(@(I)-3)=2 Box
	M,N,7,4,3.
2100	NEXT I;RETURN
3000	FOR I=1to1∅∅;@(I)=∅;
	NEXT I;FOR I=12to18
	STEP 2
3010	@(I)=2;@(I+11)=2;@(I+2∅)
	=2;@(I+31)=3;@(I+4∅)=3
3020	@(I+51)=4;@(I+6∅)=4;
	@(I+71)=4;NEXT I;A=67
3030	BC=7;FC=146;RETURN

USE OF SHADED AREA IS FOR 2ND OR MORE LINES OF MULTI-LINE STATEMENTS

DO NOT ENTER A SPACE BETWEEN LINE # AND STATEMENT.THIS IS DONE BY THE UNIT

MEMORY DUMPS and LOADERS I have received about 6 programs that 'dump' the data located in the ROM in various languages, and one is included herein that prints its answers in binary. As the others get 'scrubbed', they will be included for your information. What to do with the knowledge you will then have is up for debate.

MEMORY DUMP listing was written by Max Manowsky to yield a binary output for a selected memory location. Brett Bilbray has modified it to give a full 16 bit answer, and added the comments to go with it.

```
Line #   Statements:                                    Comments

  1    .MEMORY CONTENTS-BINARY
  2    .BY MAX MANOWSKI
  3    .MODIFIED BY B.BILBRAY
 10    INPUT D;CLEAR;PRINT#7,D;
       A=%(D);PRINT#7,A;
       IF A<0 GOTO 30
 20    GOSUB 1000;GOTO 2000
 30    A=-A;GOSUB 1000;FOR B=1 TO
       16;IF@(B)=48@(B)=49;GOTO50
 40    @(B)=48
 50    NEXT B
 60    B=1
 70    @(B)=@(B)+1
 80    IF@(B)=50 @(B)=48;
       B=B+1;GOTO 70
 90    GOTO 2000
1000   FOR B=1TO16;@(B)=A-A÷2*2
       +48;A=A÷2;NEXT B;RETURN
2000   FOR B=16TO1STEP-1;IF(B=12)
       +(B=8)+(B=4)TV=32
2010   TV=@(B);NEXT B;PRINT;
       GOTO 10
```

(margin text, rotated) USE OF SHADED AREA IS FOR 2ND OR MORE LINES OF MULTI-LINE STATEMENTS

line 10 asks for the input for the desired location, the machine prints that
        location and then the PEEKed decimal number
line 20 calls for a conversion from decimal to binary, and displays binary
line 30-90 calls the decimal to binary conversion,performs a'ones compliment'
        on the muber and calls the display routine
line 1000 stores the decimal number as a binary in @(X)
lines 2000,2010 provides the display routine for the binary number
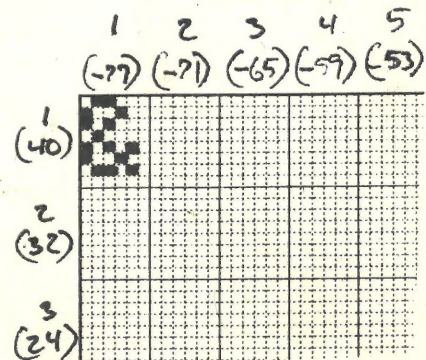
What you will get looks like this arbitrary example:
    The location I requested is 2049
         2049   5727   .decimal
              0001 0110 0101 1111 .binary

GRAPH to the right is a portion of a worksheet being developed by Chuck Thomka to identify each pixel's location on the screen for details of figure construction. Note the ampersand &

Contact Chuck at 1228 West 222 St., Torrance, CA 90502

for information as to availablity of this worksheet as well as the listing sheets as I use (sample-partial-above)

(graph grid with column headers)
```
         1     2     3     4     5
       (-77) (-71) (-65) (-59) (-53)
1
(40)
2
(32)
3
(24)
```

MEMORY DUMP program by Gary Moser prints its answers in Hexadecimal language.
See what you get for the answer to location 0006. If it is 61, then your
machine is like mine, and if it is 66, it is like Tom Wood's. If something
else, then we have more variants on the street.

RANDOM ART is a quick little moving box program by Ernie Sams.

Has been expanded
see page 49

```
Line #    Statement(s)
     1  . RANDOM ART
     2  . BY E. SAMS
    10  X=Ø; Y=Ø
    20  INPUT "WIDTH INCREMENT", W
    30  INPUT "HEIGHT INCREMENT", H
    40  X=X+W; Y=Y+H
    50  CLEAR
    60  IF X>159 W=-W; FC=RND
        (31)x8+4
    70  IF X<2 W=-W
    80  IF Y>79 H=-H
    90  IF Y<2 H=-H
   100  X=X+W; Y=Y+H
   110  IF X<1 X=1
   120  IF Y<1 Y=1
   130  BOX Ø,Ø,X,Y,3
   140  GOTO 6Ø
```

```
Line #    Statement(s)
     1  . MEMORY CONTENTS-HEX
     2  . BY G. MOSER
     5  GOTO 200
     6  C=Ø
    10  IF A<Ø GOTO 12Ø
    20  FOR N=1 TO 4
    30  B=A÷16
    40  IF RM<1Ø GOTO 6Ø
    50  RM=RM+7
    60  @(5-N)=RM+48
    70  A=B
    80  IF C=Ø GOTO 9Ø
    81  A=A+2Ø48
    90  NEXT N
   100  TV=@(3)
   101  TV=@(4)
   102  PRINT #1," ",
   103  TV=@(1)
   104  TV=@(2)
   105  PRINT
   110  RETURN
   120  A=327.67-ABS(A)+1
   130  C=1
   140  GOTO 2Ø
   200  PRINT "MEMORY LOCATION"
   210  INPUT T,U
   220  FOR V=T TO U STEP 2
   230  A = % (V)
   235  PRINT #Ø,V,
   236  PRINT #1,"/",
   240  GOSUB 6
   250  NEXT V
   260  GOTO 2ØØ
```

USE OF SHADED AREA IS FOR 2ND OR MORE LINES OF MULTI-LINE STATEMENTS

DO NOT ENTER A SPACE BETWEEN LINE # AND STATEMENT, THIS IS DONE BY THE UNIT

MACHINE LANGUAGE PROGRAMMING A further step along the way was taken by Glenn Pogue, who modified the "game over" routine of p. 25, making it print the word ARCADIAN in 2x normal letter size. I have not been able to totally duplicate this feat, I think it lies in the small differences in ROM locations that have previously been noted. The total program is:

See note page 47 (handwritten)

```
 9 CLEAR
10 A=20180;B=A;C=120                .ref p.34"LINE INPUT BUFFER from 20180..."
20 X=-43;GOSUB C                    .lines 20 to 60 call subroutine 52 and
30 X=53;GOSUB C                      define the required parameters for the
40 X=27672;GOSUB C                   70 to 100 part to work, and get back to
50 X=20190;GOSUB C                   the BASIC
60 X=-13871;GOSUB C
70 X=21057; GOSUB C                 .lines 70 thru 100 insert the letters per
80 X=16707; GOSUB C                  the scheme shown below
90 X=18756; GOSUB C
100 X=20033; GOSUB C   <105 X=0; GOSUB C   (handwritten)
110 CALL (B); STOP                  .Displays the contents of memory slots A
120 %(A)=X; A=A+2; RETURN           .POKEs the values of X into memory slots A
```

To convert the word ARCADIAN into machine language, each character is converted into its hexadecimal equivalent (use chart on p.16.) They are then paired off, each pair is swapped, and the new pair converted into decimal, as follows:

Desired characters	A	R	C	A	D	I	A	N
Hexadecimal conversion	41	52	43	41	44	49	41	4E
Pair off	4152		4341		4449		414E	
Swap within pair	5241		4143		4944		4E41	
Convert to decimal(use routine on page 36)	21057		16707		18756		20033	

And these are the values of X in lines 70 to 100.

My operation did not give a clear display. There was more material on the screen, some of it seemed to be overprinting. I inserted line 105, X=12336; GOSUB C, to add some known characters (00), and I could then see the first part of line 20 → 20 X = -43 in giant letters.

The program is presented for the experimenters in the audience who would like to have something more unusual. The program has more potential because the root subroutine, 52, has many capabilities.

LETTERS from ARCADIAN subscribers to Bally, detailing what their desires would be in the capability of the Programming Keyboard might help the Bally management to move ahead on this project. The Director of Sales is Mr. J.Nieman, Bally Consumer Products Div.,10750 West Grand Ave. Franklin Park IL, 60131.

SIMON CORRECTIONS: Make the following changes in the program:
```
Revise line 10 CLEAR;&(0(=7;&(1)=7;&(2)=0;&(3)=0;&(9)=30;
             NT=0;CX=47;CY=20;PRINT"SIMON";B=7;A=0;CX=47;
             CY=-20;PRINT "SCORE:";NT=5
Delete lines 70,80,90,100,160,170
Add lines    70 FOR X=1 TO A
             80 GOSUB @(X)x1000
            155 IF D=1 GOSUB 1000; GOTO 170
            160 IF D=2 GOSUB 2000; GOTO 170
            164 IF D=3 GOSUB 3000; GOTO 170
            166 GOSUB 4000
Revise line 150 IF D≠@(X) NT=55;MU=33;MU=48;MU=48;NT=3;
                FC=0;GOTO10
In lines 1000,2000,3000,4000 delete the -2xA  after  1 TO 255
```

REVERSE CORRECTIONS
   Revise line 260 CY=-20;PRINT"   YOU WON IN",;TV=T÷10+48;
               TV=T-T÷10x10+48;PRINT "MOVES"
          270 GOTO10
          280 CX=-50;CY=0

-46-

SAN JOSE, CA
MAY 12
PM
1979

USA 15c
THE LAND OF THE FREE · THE HOME OF THE BRAVE

FIRST CLASS

94550HUS0635L
R. HAUSER
635 LOS ALAMOS AVENUE
LIVERMORE, CA
                 94550